USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Title: Water-soluble Hydrocarbon Emissions From Marine Engines

Duration**:** (Estimate 7/1/96 - 12/31/97)

Fiscal Year 1996 Federal Funds

$40,000 (1996) + $20,000 (1997) = $60,000 (total)

Non-Federal Funds

Direct $101,170; Indirect $20,048

Total: $121,218

Principal Investigators:

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Congressional District- 1st of West Virginia

Critical Regional or State Water Problems

Proposed is research to quantify and quantify oxides of nitrogen and hydrocarbons entering water from engines of marine recreational and light commercial craft and also to

examine the benefits of biodiesel as a new fuel for compression ignition marine engines from a toxicity perspective. This research is of importance not only to the Northeast region, but to the nation as a whole. Marine engines have escaped the long standing emissions regulations that have been imposed upon automobiles and trucks, and recent marine emissions regulations have clearly been motivated by concerns over atmospheric pollution. However, it is evident that soluble hydrocarbon emissions will also be sequestered in water. Moreover, the quantity of soluble oxygenated hydrocarbons arising in the exhaust may be enhanced by the mixing of cooling water with hot products of combustion as is the design practice in most outboard and stern drive exhaust systems.

This proposed research is essential as an input model to determine the effect of gasoline and diesel fueled boat use on the ecology of rivers, lakes and estuaries. Results are of direct interest to regulatory agencies, such as Maryland Department of Natural Resources, who are funding part of this research, and the Environmental Protection Agency, which has expressed an interest in the resulting data. This data is essential for inventory of marine pollutants and is likely to be considered by marine engine manufacturers in their future engine control strategies and by fuel suppliers in their fuel formulation. In addition, the Maryland Soy Board has offered to co-fund this project.

RESULTS, BENEFITS AND INFORMATION EXPECTED

The proposed research program will provide a novel data bank which will quantify:

1) the direct influence of exhaust water injection on the formation of hydrocarbon species in marine engine exhaust. 2) the partitioning of both oxides of nitrogen and hydrocarbon emissions from marine engines between the atmosphere and the water. 3) the differences between emissions from marine compression ignition engines operating on petroleum diesel and "biodiesel" (vegetable oil esters).

To achieve this goal, techniques will be developed for collection of water-bound marine engine hydrocarbons and for the speciation of those hydrocarbons to identify specific compounds present. Techniques proven to work in this study will offer benefit to environmental researchers in future studies. Ultimately, the proposed research will provide a scientific basis for sound environmental management and regulatio$_n$ of engines in marine use. It will also provide the benefit of training two graduate students to pursue careers in environmental and emissions research.